Requirements

1. The system should work for both parallel and perpendicular parking spaces.

2. The system needs an HMI where the user must select the parking type which will initiate the system to search for spots within range of the vehicle's sensors.

    a. APA will only start when the user has initiated and verified the maneuver after a suitable spot is identified by the system.
    b. If no suitable spot is found, the system will alert the user and the system will deactivate.
    c. The HMI should display the camera feed when maneuvering.
    d. HMI should have a full override option from the user.

3. The parking spot that is desired shall be clear of obstacles before the system begins the maneuver.

4. The system will use 4 wide-angle cameras placed on each side mirror, the rear hatch, and the grille on the front of the vehicle to create the birds-eye view of the vehicle.

5. Ultrasonic sensors should be mounted on the side of the vehicle to measure if spaces have the proper amount of space to fit our vehicle.

    a. These sensors should also detect parking space lines.
    b. The space must be greater than 1.2x the length of the vehicle.
    c. The space must have 2 feet of room on each side of the vehicle.

6. Cameras and sensors will continuously monitor surroundings of the vehicle when the system is active.

7. The cameras and sensors shall be able to identify obstacles and humans that have moved into the path of the vehicle during a parking maneuver.

    a. If an obstacle is obstructing the desired parking space during the movement, the car will stop until the obstacle is removed.

    b. If the vehicle moves within 10 inches of any obstacle that is outside of the parking space, it will stop, back up, and use the sensors to readjust.

8. The system needs access to the accelerator, steering, and brakes to automate the parking.

9. The system needs to be able to go forward and reverse.

10. After the system parks the car, the car will be put into park and deactivate the system automatically.

11. The max speed of the vehicle during active park assist is 5 mph. As the vehicle moves within 6 feet of a neighboring vehicle, it will slow to 2 mph. Within 3 feet, it will slow to <1 mph.

12. The customer will have braking access while APA is operating.

13. An application shall be created for the cell phone which allows the user to control speed and position while outside the vehicle.

14. To ensure security of this application, the application shall be linked to the user's password protected account in order to only allow operation from this account.

a. The system should also have fingerprint capabilities so that only approved drivers can use the application to park their vehicle.

15. If a failure is thrown from any of the car's subsystems during a parking maneuver which directly affects a functionality of the APA system, the parking maneuver should not continue and the driver should be notified of the failure via HMI.

16. The system must be able perform necessary calculations such as radius of turn and angle of steering in order to park the vehicle.

17. Have a feature which has a map of local parking areas to aid in the initial search of finding areas to park.

18. Cameras and sensors should be resistant to below freezing or very hot conditions.

Questions

1. What happens if there are two or more spaces open between cars that are identified at once by the system?

2. Should the system operate any differently for handicapped individuals (more space)?

3. What happens if there is a fire hydrant or driveway next to an open space? (somewhere that you shouldn't park)

4. What are the testing locations for this system? Grocery stores, driveways, etc.? Should the user expect to be able to use this system at any kind of parking location?

5. What kinds of extra safety features or measures will be activated when the driver transfers control to the Ford Pass App when they exit the vehicle? How often will the driver be notified by the app in how the parking process is performing?

6. How does position control work from a phone? (How much control?)

7. What happens if the user tries to use their cell phone application while inside the car?

8. What is the average or estimated run time goal it should take for the system to run for a parallel versus a perpendicular parking?

9. What happens if someone is behind the wheel and the APA doesn't notice a pedestrian behind? What happens if the driver wants to fully override the system?

10. What happens to the system if the sensors and cameras are covered in mud or snow or obstructed in another way? How can this be accounted for?

11. What would happen if there is ice on the road and the car is unable to detect it? How would the system handle snow fully covering a parking lot?

12. How should the HMI be displayed? What sorts of displays are needed?

13. What happens if cars are very closely packed to the open parking space? How much room should be left to get out?

14. What happens if a user tries to park in a space that can only be parked in at certain times of day? (there are signs on side of road)

15. How does the system determine if a space should be pulled or backed into?

16. What types of security measures need to be in place for the system?

17. What happens if the car is turned off while the system is active?